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EPA April 2013 combined split results

MEMORANDUM

TO: File, West Lake Landfill OU1

THROUGH: Bill Pedicino, ENSV

DeAndre Singletary, SUPR/MOKS

FROM: Dan Gravatt, SUPR/MOKS

DATE: July 15, 2013

SUBJECT: West Lake Landfill, April 2013 Additional Groundwater Sampling Event Report, July 8, 2013, Comparison of EPA split sample results to PRPs results

[See attached Excel spreadsheet: "EPA April 2013 combined split results.xls]

In April 2013, EPA collected split samples from twelve (12) wells as part of the PRP's additional groundwater sampling event at the West Lake Landfill site. EPA's split samples were analyzed for isotopic radium, thorium and uranium; metals, and VOCs. EPA's split samples for metals and the isotopic radiological samples were unfiltered (total) only, whereas the PRPs collected both total and field-filtered fractions for these analyses. The wells from which EPA collected splits were: D-6, PZ-101-SS, S-82, PZ-104-SD, D-93, D-3, PZ-113-AD, PZ-102-SS, I-9, D-85, D-83 and S-5.

EPA's split isotopic radiological samples were analyzed by TestAmerica in Earth City, Missouri, using DOE's EML A-01-R MOD analytical procedures for U and Th and EPA methods 903 MOD and 904 MOD for Ra isotopes. EPA's split samples for metals and VOCs were analyzed by TestAmerica in Earth City, Missouri, using EPA methods 6010C and 8260C, respectively.

The PRPs' isotopic radiological samples were analyzed by Eberline Laboratories in Oak Ridge, Tennessee, using DOE's EML Th-01 and U-02 methods, and EPA 903 MOD and 904 methods for Ra isotopes. The PRP's analyses for metals and VOCs were analyzed by TestAmerica in St. Louis, Missouri using EPA methods 6010C and 8260C, respectively.

Based on my on-site observations during the split sample collection, review of the TestAmerica data deliverables for EPA samples, and review of the PRP's sampling event report, the laboratories and field personnel used the appropriate QA/QC procedures as specified in the QAPPs and their SOPs, and the results were qualified as necessary.

Radiological split results comparison

Much of both EPA's and the PRPs' data sets for Th and U are qualified as either non-detect (U) or estimated (J) or both, while several of the Ra results were J-qualified. The results for Th and U were all less than 10 pCi/L with the exception of PZ-102-SS, resulting in large RPDs even if the two results were close in value. RPDs range from less than 20% to more than 100%. RPDs for Ra were generally below

0714 3.0

OU01

50%, as there were no non-detect data. In all but one of the twelve sample pairs, the PRP's results for Ra were higher than the EPA split results. RPDs for isotopic radiological data may overestimate the variability due to sample collection and analytical methodology, since unlike other contaminants, the "concentration" of each isotope varies slightly from moment to moment as the gamma emission rate during counting is not exactly constant.

RPDs for the three highest-concentration results from EPA and PRP data for combined radium-226 and -228, respectively (PZ-104-SD, 10.4 and 8.4 pCi/L, 19.2% RPD; PZ-101-SS, 19.9 and 24.0 pCi/L, 17.1% RPD; PZ-102-SS, 11.0 and 16.0 pCi/L, 31.3% RPD) are reasonable and do not indicate any significant problems with the comparability of the laboratory analytical procedures or the field collection procedures.

Non-radiological split results comparison

The vast majority of EPA's and the PRPs' data sets for non-radiological constituents was qualified as non-detect (U), such that very few split comparisons are able to be made. The most frequently detected constituents occurring in both paired samples include arsenic, barium, manganese, benzene and chlorobenzene. RPDs for these analytes were nearly all below 50%. RPDs in this range are reasonable and do not indicate any significant problems with the comparability of the laboratory analytical procedures or the field collection procedures.

Summary

The EPA and PRPs data sets for the twelve wells from which EPA collected split samples are generally comparable with reasonable RPD values as outlined above. The laboratory analytical methods were appropriate, proper QA/QC measures appear to have been taken, and the data has been qualified as necessary. These split results provide additional confidence that the groundwater data collected by the PRPs in the April 2013 sampling event are accurate and representative of groundwater conditions at the Site at that time.

Analyte	Units	D-93	Qual	D-93 PRP	Final Q	S-82	Qual	S-82 PRP
Thorium-228	pCi/L	0.113	U	0.16	J	0.246		0.12
Thorium-230	pCi/L	0.0399	U	0.09	J	0.242		0.24
Thorium-232	pCi/L	0.0199	U	0.01	U	0.075	U	0.11
Total Th	**pCi/L**	**0.1728**		**0.26**		**0.563**		**0.47**
Uranium-233/234	pCi/L	0.145		0.39		1.08		1.26
Uranium-235/236	pCi/L	0	U	0.03	U	0.088	U	0.12
Uranium-238	pCi/L	0.134		0.16	J	0.787		1.09
Total U	**pCi/L**	**0.279**		**0.58**		**1.955**		**2.47**
Radium-226	pCi/L	1.95		3.02		1.18		1.63
Radium-228	pCi/L	4.59		4.79	J	1.65		2.04
Total Ra	**pCi/L**	**6.54**		**7.81**		**2.83**		**3.67**
Mercury	ug/L	ND		ND	U	ND		ND
Aluminum	ug/L	440	J	1100		7900		4300
Antimony	ug/L	ND		ND	U	ND		ND
Arsenic	ug/L	ND		ND	U	220		230
Barium	ug/L	1400		1400		1400		1300
Beryllium	ug/L	ND		ND	U	ND		ND
Cadmium	ug/L	ND		ND	U	6	J	6
Calcium	ug/L	310000		290000		290000		240000
Chromium	ug/L	ND		ND	U	18	J	17
Cobalt	ug/L	ND		ND	U	91	J	62
Copper	ug/L	ND		ND	U	ND		ND
Iron	ug/L	21000		21000		71000		59000
Lead	ug/L	ND		9.5	J	140		110
Magnesium	ug/L	79000		81000		92000		89000
Manganese	ug/L	430		450		2700		2600
Nickel	ug/L	ND		ND	U	260		180
Potassium	ug/L	16000	J	16000	J	13000	J	13000
Selenium	ug/L	ND		ND	U	ND		ND
Silver	ug/L	ND		ND	U	ND		ND
Sodium	ug/L	220000		220000		390000		410000
Thallium	ug/L	ND		ND	U	ND		ND
Vanadium	ug/L	ND		ND	U	73	J	44
Zinc	ug/L	46	J	31	U	340		160
1,1,1-Trichloroethane	ug/L	ND		ND	U	ND		ND
1,1,2,2-Tetrachloroethane	ug/L	ND		ND	U	ND		ND
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/L	ND				ND		
1,1,2-Trichloroethane	ug/L	ND		ND	U	ND		ND
1,1-Dichloroethane	ug/L	2.6	J	ND	U	ND		ND
1,1-Dichloroethene	ug/L	ND	*	ND	U	ND	*	ND
1,2,4-Trichlorobenzene	ug/L	ND		ND	U	ND		ND
1,2-Dibromo-3-Chloropropane	ug/L	ND		ND	U	ND		ND
1,2-Dichlorobenzene	ug/L	ND		ND	U	ND		ND
1,2-Dichloroethane	ug/L	ND		ND	U	ND		ND
1,2-Dichloropropane	ug/L	ND		ND	U	ND		ND
1,3-Dichlorobenzene	ug/L	ND		ND	U	ND		ND

1,4-Dichlorobenzene	ug/L	ND		ND	U	ND		ND
2-Butanone (MEK)	ug/L	ND		ND	U	ND		ND
2-Hexanone	ug/L	ND		ND	U	ND		ND
4-Methyl-2-pentanone (MIBK)	ug/L	ND		ND	U	ND		ND
Acetone	ug/L	ND		ND	U	ND		ND
Benzene	ug/L	1.5	J	1.6	J	ND		ND
Bromoform	ug/L	ND		ND	U	ND		ND
Bromomethane	ug/L	ND	*	ND	U	ND	*	ND
Carbon disulfide	ug/L	ND		ND	U	ND		ND
Carbon tetrachloride	ug/L	ND		ND	U	ND		ND
Chlorobenzene	ug/L	ND		ND	U	0.93	J	0.87
Dibromochloromethane	ug/L	ND		ND	U	ND		ND
Chloroethane	ug/L	ND		ND	U	ND		ND
Chloroform	ug/L	ND		ND	U	ND		ND
Chloromethane	ug/L	ND		ND	U	ND		ND
cis-1,2-Dichloroethene	ug/L	23		22		1.6	J	1.3
cis-1,3-Dichloropropene	ug/L	ND		ND	U	ND		ND
Cyclohexane	ug/L	ND		ND	U	ND		ND
Bromodichloromethane	ug/L	ND		ND	U	ND		ND
Dichlorodifluoromethane	ug/L	ND		ND	U	ND		ND
Ethylbenzene	ug/L	ND		ND	UJ-	ND		ND
1,2-Dibromoethane (EDB)	ug/L	ND		ND	U	ND		ND
Isopropylbenzene	ug/L	ND		ND	U	ND		ND
Methyl acetate	ug/L	ND		ND	U	ND		ND
Methyl tert-butyl ether	ug/L	ND		ND	U	ND		ND
Methylcyclohexane	ug/L	ND		ND	U	ND		
Methylene Chloride	ug/L	ND		ND	U	ND		ND
m-Xylene & p-Xylene	ug/L	ND		ND	U	ND		ND
o-Xylene	ug/L	ND		ND	U	ND		ND
Styrene	ug/L	ND		ND	U	ND		ND
Tetrachloroethene	ug/L	ND		ND	U	ND		ND
Toluene	ug/L	ND		ND	U	ND		ND
trans-1,2-Dichloroethene	ug/L	ND		ND	U	ND		ND
trans-1,3-Dichloropropene	ug/L	ND		ND	U	ND		ND
Trichloroethene	ug/L	ND		ND	U	ND		ND
Trichlorofluoromethane	ug/L	ND		ND	U	ND		ND
Vinyl chloride	ug/L	21		23		0.45	J	ND
Xylenes, Total	ug/L	ND		ND	U	ND		ND

Note: PRPs data did not report the compound 1,1,2-Trichloro-1,2,2-trifluoroethane.

Final Q	I-9	Qual	I-9 PRP	Final Q	D-6	Qual	D-6 PRP	Final Q	D-83	Qual	D-83 PRP
J	0.119	U	0.15	J	0.0409	U	0.14	J+	0.153	U	0.2
J	0.127	U	0.11	J	0.102	U	0.13	J+	0.0794	U	0.47
J	0.0111	U	-0.02	U	0.0296	U	0.04	UJ	0.0188	U	-0.01
	0.2571		**0.24**		**0.1725**		**0.31**		**0.2512**		**0.66**
J	0.147		0.14	J	0.0802	U	0.22	J	0.0514	U	0.03
UJ	-0.00879	U	0	UJ	-0.00461	U	0.02	U	0.0198	U	-0.02
J	0.147		0.04	UJ	0.107		0.12	J	0	U	-0.05
	0.28521		**0.18**		**0.18259**		**0.36**		**0.0712**		**-0.04**
	1.24		1.48		2.01		1.91		2.73		3.17
	1.81		3.81	J	3.04		5.89	J+	4.28		5.53
	3.05		**5.29**		**5.05**		**7.8**		**7.01**		**8.7**
U	ND		ND	U	ND		ND	U	ND		ND
	ND		ND	U	600	J	740	J	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
	34	J	26	U	ND		ND	U	ND		ND
	1500		1400		1300		1300		1800		1800
U	ND		ND	U	ND		ND	U	ND		ND
J	ND		ND	U	ND		ND	U	ND		ND
	280000		270000		220000		230000		110000		110000
J	ND		ND	U	ND		ND	U	ND		ND
J	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
	34000		34000		17000		18000		15000		15000
	ND		ND	U	ND		ND	U	ND		ND
	71000		72000		57000		61000		34000		35000
	1100		1200		570		610		340		350
J	ND		ND	U	ND		ND	U	ND		ND
J	20000	J	20000	J	13000	J	13000	J	41000		41000
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
	250000		250000		130000		140000		75000		76000
U	ND		ND	U	ND		ND	U	ND		ND
J	ND		ND	U	ND		ND	U	ND		ND
	ND		31	U	28	J	31	U	35	J	35
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
	ND				ND				ND		
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND	*	ND	UJ-	ND	*	ND	U	ND	*	ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND

U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND	*	ND	UJ-	ND	*	ND	U	ND	*	ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
J	ND		ND	U	ND		ND	U	ND		0.76
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
J	ND		ND	U	0.5	J	ND	U	0.18	J	ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
UJ-	ND		ND	U	ND		ND	UJ-	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	6.4		6.2		1.7	J	1.1
	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND
U	2.5	J	2.8	J	ND		ND	U	ND		ND
U	ND		ND	U	ND		ND	U	ND		ND

Final Q	PZ-102-SS	Qual	PZ-102-SS PRP	Final Q	PZ-104-SD	Qual	PZ-104-SD PRP	Final Q
J+	2.28	G	3.24	J+	-0.0398	U	0.05	UJ+
J+	2.56		3.03	J+	0.689	U	0.17	J+
UJ	2.3		4.35		-0.0514	U	0.02	U
	7.14		**10.62**		**0.5978**		**0.24**	
UJ	3.98		5.7	J	0.357	U	0.18	UJ
UJ	-0.0828	U	0.33	J	-0.0476	U	0.46	UJ
UJ	3.98		4.73	J	0.432	U	0.2	UJ
	7.8772		**10.76**		**0.7414**		**0.84**	
	8.3		8.05	J	7.58		5.72	J
J+	2.69		7.98	J+	2.84		2.72	J+
	10.99		**16.03**		**10.42**		**8.44**	
U	0.14	J ^ B *	0.14	J	ND	^ *	ND	U
U	37000		26000		ND		ND	U
U	ND		ND	U	ND		ND	U
U	21	J	19	U	ND		20	U
	780		690		990		1600	
U	ND		3.5	U	ND		ND	U
U	ND		ND	U	ND		ND	U
	170000		150000		150000		150000	
U	50	J	33	J	ND		42	J
U	ND		ND	U	ND		ND	U
U	60	J	29	J	ND		ND	U
	46000		34000		22000		22000	
U	70	J	57		ND		ND	U
	61000		57000		78000		91000	
	1200		1000		160		180	
U	ND		80	J	ND		ND	U
	ND		ND	U	17000	J	34000	
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
	38000		38000		180000		260000	
U	ND		ND	U	ND		ND	U
U	100	J	65	J	ND		34	J
U	230	B	170		ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
	ND				ND			
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND	*	ND	U	ND	*	ND	U
U	ND		ND	U	ND		3.4	J
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U

U	ND		ND	U	5.1		4.1	J
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	840		820	
U	ND		ND	U	ND		ND	U
U	ND	*	ND	U	ND	*	ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
J	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	2.1	J	2.1	J
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	0.17	J	ND	U
U	ND		ND	U	ND			
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
UJ-	ND		ND	U	18		18	
U	ND		ND	U	ND		ND	U
U	ND		ND	U	1.5	J	1.4	J
U	ND		ND	U	ND		ND	U
J	ND		ND	U	3.1	J	3.3	J
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	35		33	
U	ND		ND	U	11		11	
U	ND		ND	U	0.75	J	ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	1200		1500	
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	ND		ND	U
U	ND		ND	U	46		44	

PZ-113-AD	Qual	PZ-113-AD PRP	Final Q	D-3	Qual	D-3 PRP	Final Q	D-85	Qual
0.204	U	0.12	J+	0.525	U G	0.07	UJ+	3.09	G
0.637	U	0.14	J	0.734	U	0.17	J	6.53	
-0.00265	U	0.06	J	-0.0596	U	0.01	UJ	2.71	G
0.83835		**0.32**		**1.1994**		**0.25**		**12.33**	
0.0806	U	0.29	UJ	0.39	U	-0.02	UJ	1.17	
0.154	U	-0.02	UJ	-0.0224	U	0.11	UJ	0.263	U
-0.0557	U	0.15	UJ	0.0957	U	0.02	UJ	1.61	
0.1789		**0.42**		**0.4633**		**0.11**		**3.043**	
2.43		2.27	J	1.9		2.82	J	3.86	
6.73		7.01	J+	5.19		4.38	J+	3.9	G
9.16		**9.28**		**7.09**		**7.2**		**7.76**	
ND	^ *	0.08	J	0.066	J ^ B *	0.069	J	0.16	J ^ B *
ND		ND	U	ND		ND	U	53000	
ND		ND	U	ND		ND	U	48	J
ND		ND	U	ND		ND	U	72	J
2200		2200		2300		2300		6300	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
290000		280000		300000		280000		890000	
ND		ND	U	ND		ND	U	63	J
ND		ND	U	ND		ND	U	150	J
ND		ND	U	ND		ND	U	78	J
35000		34000		32000		31000		290000	
17	J	7.5	U	ND		8.5	U	170	
85000		85000		84000		85000		140000	
680		650		510		500		8800	
ND		ND	U	ND		ND	U	350	J
26000	J	26000		28000	J	28000		17000	J
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
340000		350000		390000		390000		160000	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	190	J
ND		27	U	ND		ND	U	640	B
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND				ND				ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND	*	ND	U	ND	*	ND	UJ-	ND	*
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	

ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND				ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
1.2	J	3.1	J	0.57	J	0.29	U	0.42	J
ND		ND	U	ND		ND	U	ND	
ND	*	ND	U	ND	*	ND	UJ-	ND	*
ND		0.42	J	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	1.6	J	1.5	J	60	
ND		ND	U	ND				ND	
ND		ND	U	ND		ND	UJ-	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND				ND		ND	U	ND	
ND				ND				ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND				ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND				ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	0.59	J	ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
2.4	J	ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	
ND		ND	U	ND		ND	U	ND	

D-85 PRP	Final Q	S-5	Qual	S-5 PRP	Final Q	PZ-101-SS	Qual	PZ-101-SS PRP	Final Q
3.15	J+	0.163	U G	0.05	UJ+	0.269	U	0.05	U
5.81		1.36		0.18	J	1.05		0.33	J+
2.79		-0.0609	U	-0.01	U	-0.0669	U	0.08	U
11.75		**1.4621**		**0.22**		**1.2521**		**0.46**	
1.73		-0.0684	U	-0.06	UJ	1.35		0.73	J
0.24	J	-0.0232	U	0.13	UJ	-0.0664	U	0.17	UJ
2.62		0.106	U	-0.11	UJ	0.645		0.55	J
4.59		**0.0144**		**-0.04**		**1.9286**		**1.45**	
9.67	J	0.438		1.1	J	18		21.89	J
6.41	J+	0.418	U	5.03	J+	1.87		2.12	J+
16.08		**0.856**		**6.13**		**19.87**		**24.01**	
0.14	J+	0.12	J ^ B *	0.071	J	ND		0.067	J-
33000		ND		ND	U	2400		2300	
ND	U	ND		ND	U	ND		ND	U
71		ND		12	J	20	J	22	U
4100		470	J	450		520		480	
3.5	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
460000		72000		65000		160000		160000	
59		ND		ND	U	ND		ND	U
57	J	ND		ND	U	ND		ND	U
110	J	ND		ND	U	ND		ND	U
180000		20000		19000		13000		15000	
100		ND		8.5	J	12	J	9	J
95000		60000		58000		97000		98000	
5200		260		240		120		130	
460		ND		75	J	ND		ND	U
13000	J	190000		180000		15000	J	14000	J
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
160000		410000		400000		100000		100000	
ND	U	ND		ND	U	ND		ND	U
89	J	47	J	ND	U	ND		ND	U
370		78	J B	55	U	84	J	99	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND				ND		ND	U
		ND				ND			
ND	U	ND		ND	U	ND		ND	U
ND	U	0.41	J	ND	U	ND		ND	U
ND	U	ND	*	ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	1.9	J	1.7	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U

ND	U	10		9.8		ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	9.5	J	9.2	J
0.73	J	4.9	J	4.7	J	1.3	J	0.81	J
ND	U	ND		ND	U	ND		ND	U
ND	U	ND	*	ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
59		3.4	J	3.1	J	1.6	J	1.7	J
ND	U	ND				ND		ND	U
ND	U	ND		0.49	J	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	2.7	J	2.5	J	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND				ND			
ND	U	1.9	J	1.5	J	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	0.67	J	0.53	J	0.68	J	0.65	J
ND	U	0.28	J	ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	14		13		ND		ND	U
ND	U	7.7		6.6		ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	5		5		ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND				ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	ND		ND	U	ND		ND	U
ND	U	22		20		ND		ND	U